

## Research Article

# Experience with urethral mobilization for distal hypospadias with meatal variants



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### Abstract

**Introduction:** Hypospadias has been reported to occur in 1 of 200 to 1 of 300 live births. Distal hypospadias constitutes approximately 65- 70% of all hypospadias cases, The MAGPI operation popularized by Duckett gained wide acceptance because of simplicity. The main drawbacks were meatal retraction and stenosis. In the current study we have used urethral mobilization for repair of distal hypospadias with meatal variants. **Patients and Methods:** Our study was a prospective clinical study, was performed at Nephrology and Urology Hospital, Minia University. We included patients with glanular, coronal, and sub coronal hypospadias who are not ideal for MAGPI repair in the period from June 2021 to January 2023. We excluded cases with Distal, mid-penile and proximal types of hypospadias, patients with chordee, recurrent cases. **Results:** A total of 22 patients underwent urethral mobilization technique. Age ranges from 8 months to 5 years. The mean distance between the tip of the glans and proximal end of hypospadiac meatus was 0.8 cm. Overall major complications occurred in 2/22 (9.1%) Postoperative follow-up parameters and complications are shown as follow; No fistula, Meatal stenosis, urethral stricture or persistent curvature occurred. **Conclusion:** Urethral mobilization technique is a good technique, easy to learn with low overall complication rate. It can be applied safely in patients with distal hypospadias who had meatal variants not candidates for MAGPI operation

**Key words:** hypospadias, urethral mobilization .

### Introduction

Hypospadias has been reported to occur in 1 of 200 to 1 of 300 live births<sup>(1)</sup>. Distal hypospadias constitutes approximately 65-70% of all hypospadias cases<sup>(2)</sup>. Various techniques had been reported for repair of distal hypospadias including; meatal advancement and glanuloplasty (MAGPI)<sup>(3,4)</sup>, Mathieu procedure<sup>(5)</sup>, glans approximation procedure (GAP)<sup>(6)</sup> tubularized incised plate urethroplasty (TIP)<sup>(7)</sup> and urethral mobilization<sup>(8-12)</sup>.

The MAGPI operation popularized by Duckett gained wide acceptance because of its simplicity, absence of flaps or grafts, lack of urinary diversion and can be applied in glanular, coronal and even subcoronal hypospadias<sup>(3,4)</sup>. The main drawbacks were meatal retraction and stenosis<sup>(13, 14)</sup>. Gibbons and Gonzales<sup>(15)</sup> described 3 meatal variants that not appropriate for MAGPI operation including; wide meatus, non-compliant, and thin hypoplastic urethra surrounding the meatus. They advised the use of an alternate

technique instead of MAGPI. In the current study we have used urethral mobilization for repair of distal hypospadias with meatal variants.

## Patients and methods

### Study Design and patients

Our study was a prospective clinical study, was performed at Nephrology and Urology Hospital, Faculty of Medicine, Minia University. The study was approved by institutional board review and a written consent was approved by patient's guardians. The study included patients with distal hypospadias attending at our department in the period from June 2021 to January 2023 and underwent hypospadias repair by urethral mobilization technique. We included patients with glanular, coronal, and sub coronal hypospadias who are not ideal candidates for MAGPI repair due to the presence of meatal variants previously described<sup>(15)</sup>. These included; wide and patulous meatus, non-compliant meatus that is inelastic or immobile meatus and hypoplastic urethral covered by thin peri-meatal skin covering divergent spongiosum. We excluded cases with distal, mid-penile and proximal types of hypospadias, patients with persistent moderate to severe chordee after penile degloving, recurrent cases and in cases with long hypoplastic urethra extending long distance proximally.

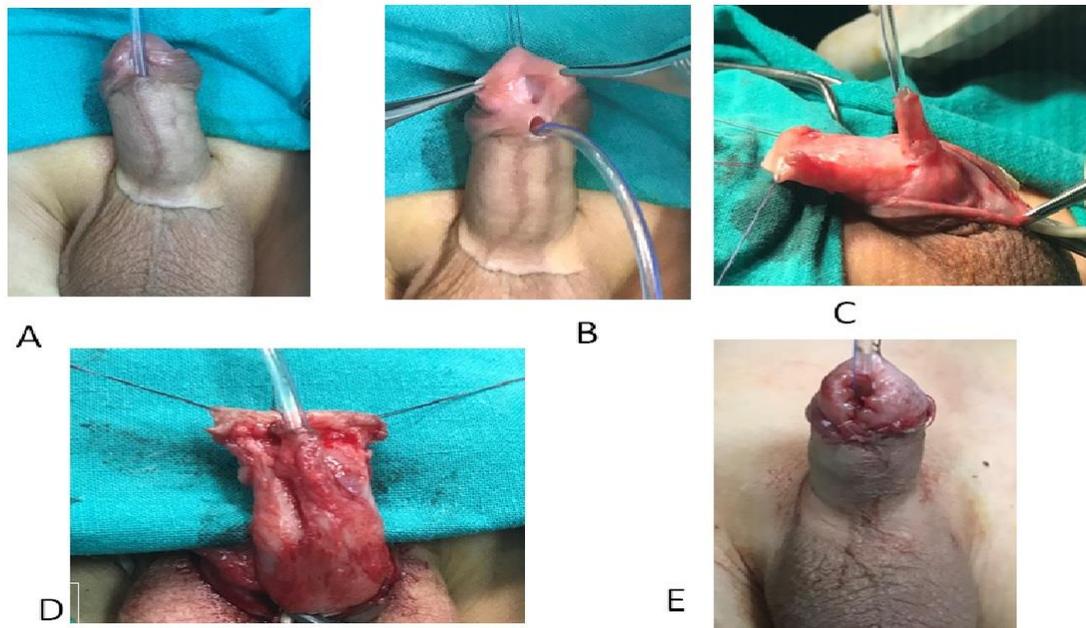
### Surgical technique:

The procedure was performed under general anesthesia and all the patients received pre-operative broad spectrum antibiotic pro-phylaxis. A 6-0 traction suture was placed just, dorsal to the tip of the glans penis. A small feeding tube was introduced through the hypospadiac meatus and passed into the bladder. The quality of peri-urethral skin and the presence of hypoplastic urethra proximal to the meatus were determined. We excised the thin peri-meatl skin covering the distal urethra to healthy segment. The distance between the tip of the glans and proximal end of the hypospadiac meatus was measured and recorded.

A circumcising incision 5 mm proximal to the corona started posteriorly and extended ventrally below the hypospadiac meatus. Penile degloving till penoscrotal junction was performed with removal of any tethering dartos tissues and artificial erection was performed to assess any residual curvature.

An inverted Y- shaped incision was made on the urethral plate with vertical limb of Y extended from the tip of the glans to the distal hypospadiac meatus without entering it. The two oblique limbs of Y extended laterally and circumscribed the hypospadiac meatus and separated the meatus from the adjacent glans wings. By the aid of gentle traction of the catheter urethral mobilization was achieved by dissection of the urethra dorsolateral in the avascular plane between corpora cavernosa and corpus spongiosum. Dissection was continued proximally until 3 folds of the previous measured distance between the tip of the glans and the hypospadiac meatus. Urethral mobilization was satisfactory when the distal end of the urethral reached the tip of the stretched glans without tension.

The ventral glans incision was deepened in the midline with lateral mobilization of the glans wings. The terminal end of the urethra was trimmed obliquely and distal end of the urethra was anastomosed to the glans with interrupted sutures. Fixation of the corpus spongiosum to nearby cavernousum was performed by 2 interrupted sutures in the shaft penis. Glans wings were closed over the urethra by interrupted sutures leaving a wide slit like meatus. Bayers flaps were performed. The ventral skin was aligned in the midline with good collar and excess skin was excised. A silicon urethral catheter of appropriate size was inserted and connected to double diaper in small children, while connected to collecting urine bag in older children. A compressive dressing was used in cases. The technique of urethral mobilization is shown in Fig (1).



**Fig.1 A- Preoperative appearance, B- Meatus and glanular groove, C- Urethral dissection, D- Urethral mobilization completed, E- Operation completed**

#### Postoperative follow-up

All patients were monitored postoperatively. Patients who didn't develop any complications were discharged after 24-48 hours from admission. The dressing and the catheter were removed after 1 week in the outpatient clinic. The patients were followed weekly for the first months and then at 3 and 6 months postoperatively.

#### Data collection and statistical analysis

Data collection included preoperative data as, patient age site and shape of the hypospadiac meatus, distance from hypospadiac meatus to proximal lip of urethral meatus, character of urethral plate, types of meatal variants and associated penile curvature. Intraoperative data included; intraoperative complications and operative time. Postoperative data included; duration of catheterization, shape of the meatus, development of complications and observation of urinary stream by parents and in the outpatient clinic.

Data were checked, entered, and analyzed using SPSS (version 15, special package for social science). Data was expressed as average and mean for quantitative variables, number and

percentage for qualitative ones. Chi-squared ( $\chi^2$ ) with  $P < 0.05$  was statistically significant.

#### Results

A total of 22 patients underwent urethral mobilization technique. Age ranges from 8 months to 5 years (Mean 28.8 months). The site of hypospadiac meatus was; glanular in 5(22.7%), coronal in 10(45.5%) and subcoronal in 7(31.8%) patients. The urethral plate was deep in 13(59.1%) and shallow in 9(40.9%) patients. The urethral plate width was  $>7\text{mm}$  in 15 and  $<7\text{mm}$  in 7 patients. Meatal variants were present in all the cases including; wide meatus in 8(36.4%), non-compliant meatus in 11 (50%), hypoplastic urethra in 3(13.6) and mixed variants in 11(50%) patients. Five patients (22.7%) were circumcised and 17(77.3%) were not. The mean distance between the tip of the glans and proximal end of hypospadiac meatus was 0.8 cm (ranges from 0.4 to 1cm) and the length of mobilized urethra ranged from 1.2 to 3cm. Mild degree of intraoperative penile curvature was present in 5(22.7%) patients and penile degloving was the only method to accomplish orthoplasty. The mean Intraoperative time was 62.9 minutes (range 45-80 minutes). All the operations were ended successfully without intraoperative complications

except one case of accidental urethral injury during dissection. The urethra was closed successfully without postoperative event. Patient’s demographics and preoperative data are shown in Table (1). As regard postoperative parameters, the mean hospital stay was 1.5 day (range 1-2days), halve of the cases were one day case. The mean follow-up was 18.5 months (range 6-26 months).

Minor postoperative complications occurred in 2 patients in the form of hematoma in 1 and penile

edema in 1patient, which were resolved spontaneously with expectant treatment. Mid glans disruption and meatal retraction occurred in 2 patients. These cases occurred early in our series and were attributed to inadequate stretched glans during glans urethral anastomosis. Overall major complications occurred in 2/22 (9.1%) Postoperative follow-up parameters and complications are shown in Table (2). No fistula, Meatal stenosis, urethral stricture or persistent curvature occurred. All the patients had a slit like meatus with good shape and force of urinary stream.

**Table1: Demography and pre-operative data of cases**

Parameter	cases (n =22)
<b>Site of hypospadiac meatus</b>	
• Glanular	5(22.7%)
• Coronal	10(45.5%)
• Subcoronal	7(31.8%)
<b>Depth of urethral plate</b>	
• Deep	13(59.1 %)
• Shallow	9 (40.9%)
<b>Width of urethral plate</b>	
• Wide>7mm	15(68.2%)
• Narrow< 7mm	7 (31.8%)
<b>Meatal variants</b>	
• Wide meatus	8(36.4%)
• Non-compliant meatus	11(50%)
• Hypoplastic urethra	3 (13.6%)
• Mixed variants	11(50%)
<b>Circumcision</b>	
• Yes	5(22.7%)
• NO	17(77.3%)

**Table 2: Postoperative complications**

Postoperative complications	cases (n =22)
<b>Minor</b>	2(9.1%)
• Hematoma	1(4.55%)
• Penile edema	1(4.55%)
<b>Major</b>	2(9.1%)
Meatal retraction	2(9.1%)
Fistula	0
Urethral stricture	0
Meatal stenosis	0
Persistent curvature	0

## Discussion

The objectives of hypospadias repair include; straight penis, adequate neourethra, normal appearance of the glans, slit-like meatus and normal voiding with low postoperative complications<sup>(16)</sup>. Numerous techniques for repair of distal hypospadias had been reported<sup>(3-12)</sup>. The ideal candidates for MAGPI operation are patients with distal hypospadias with thick and mobile peri-meatal skin, good glans configuration and average size of meatus<sup>(4)</sup>. In the current study, 22 distal hypospadias patients with meatal variants not suitable for MAGPI<sup>(15)</sup> were included. All the patients underwent urethral mobilization technique previously described<sup>(8-12)</sup>.

Beck familiarized urethral advancement for the first time in 1898<sup>(8)</sup>. Unsuccessful outcome with great prevalence of postoperative curvature led to loss of interest in the technique. Further improvement in the technique with adequate mobilization of the urethra and good results were reported by Atalla<sup>(9)</sup>. Further published reports supported urethral mobilization technique with good reproducible results<sup>(8-12, 17-19)</sup>. The proposed advantages of urethral mobilization include; anatomical repair, easy to perform with short learning curve, no need of flaps or grafts and reproducibility of technique<sup>(10, 11, 17, and 18)</sup>.

There is variability between authors as regard initial incision and dissection of the urethra, some authors started mobilization of the urethra in proximal location where the urethra is enveloped by healthy spongiosum and easier dissection was achieved<sup>(10,11)</sup>. While others, started urethral mobilization from distal to proximal with the same comparable results<sup>(12,17)</sup>. In the current study, after complete degloving, we performed an inverted Y- shaped incision with vertical limb of Y extended from the tip of the glans to the distal hypospadiac meatus without entering it. The two oblique limbs of Y extended laterally and circumscribed the hypospadiac meatus and separated the meatus from the adjacent glans wings. Mobilization of the urethra started from distal to proximal without difficulty and this was in an agreement with previous reports<sup>(12, 17)</sup>.

The length of mobilized urethra varied between published reports, mobilization 3 folds the original distance between the tip of the glans and hypospadiac meatus was reported<sup>(10, 12, and 18)</sup>. Others reported 4-5 folds urethral mobilization especially in mid shaft hypospadias<sup>(9, 11)</sup>. In the current study, all our cases were distal hypospadias. We measured distance between the tip of the glans and proximal end of hypospadiac meatus, and we adopt 3 folds mobilization. The mean was 0.8 cm (ranges from 0.4 to 1cm) and the length of mobilized urethra ranged from 1.2 to 3cm. We achieved tension free anastomosis in all the cases.

In the current study, Intraoperative complications were not reported except for one case of accidental urethral injury during urethral mobilization in early cases of our series. The urethra was sutured without any postoperative sequel. This was in an agreement with other studies<sup>(17, 20)</sup>.

The mean operative time in the current study was 62.9 minutes (range 45-80minutes). This was comparable with Elemen and Tugay<sup>(17)</sup> who reported that the mean operative time was 60.94, while was longer than El Darawany et al.,<sup>(12)</sup>. Who reported that the mean operative time was 38 minutes (range 30-45 minutes). This may be explained by initial learning curve, residency training and multiplicity of surgeons.

One of the advantages of hypospadias surgery is short hospital stay and rapid ambulatory service, hospital stay ranged from 0-6 days<sup>(12)</sup> and 2-10 days<sup>(21)</sup>. Our study showed the shortest hospital stay as it was 1.5 day (range 1-2 days), halve of the cases were one day case.

Urinary diversion after hypospadias is important to prevent meatal edema and encrustation. After urethral mobilization technique, Atalla<sup>(9)</sup> and Hammouda et al.,<sup>(10)</sup> kept the catheter for one day, others reported catheter removal after 3, 5, 7 days respectively<sup>(18, 12, 11)</sup>. In the current study our practice is to remove the catheter and the dressing after 1 week postoperatively. This may be longer

than previously published reports. We think that urethral mobilization technique involves urethral dissection, glans wings development and urethral-glans fixation. Prolonged catheterization prevented meatal edema, allowed sound urethral glans healing and none of our patients developed meatal stenosis. In addition, early discharge of our patients necessitates proper diversion at home.

The most common complications after urethral mobilization technique are meatal stenosis, meatal retraction, glanular dehiscence and persistent curvature<sup>(10-12,17-20)</sup>, the reported incidences of meatal stenosis were 3.3%, 4.2%, 5.4% and 10% respectively<sup>(12,22,18,19)</sup>. Important factors for prevention of meatal stenosis include; proper urethral mobilization, preservation of urethral blood supply, deep glanular dissection with wide granular wings, oblique wide urethral glans anastomosis<sup>(10,19)</sup>. In the current study, no patient developed meatal stenosis. This is in an agreement with previously published reports<sup>(9-11)</sup>. We applied all the previous factors for prevention of meatal stenosis in addition to prolonged urethral catheterization.

The second most common complication after urethral mobilization is meatal retraction. The same factors responsible for meatal stenosis are also responsible for meatal retraction. The reported incidences of meatal retraction were, 1.8%, 2.7%, and 6.7% respectively<sup>(10,9, and 19)</sup>. In our study meatal retraction occurred in 2 cases, 9.1% these cases occurred during initial cases performed and were attributed to inadequate stretched glans during glans urethral anastomosis. This may be higher than previous reports because of small number of our series. Our overall complication rate was 9.1%. No cases in our study developed fistula or stricture.

The current study had some Limitations including; small number of cases, short post-operative follow-up and multiplicity of surgeons.

### Conclusions

Urethral mobilization technique is a good technique, easy to learn with low overall complication rate. It can be applied safely in

patients with distal hypospadias who had meatal variants not candidates for MAGPI operation

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